



## Groundwater Protection Program

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### Vashon-Maury Island Water Resources Evaluation *Initial Water Level Trend Analysis* *April 2004*

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#### Introduction and Background

The Vashon-Maury Island Water Resources Evaluation is a 7-year project designed to describe and assess the water supply on VMI. Vashon-Maury Island (VMI) is a thirty-seven square mile area located in the southern end of Puget Sound. Low-density residential development covers much of the Island with zoning of one home per five and ten acres. Higher density residential areas are concentrated in the Vashon Town Center, Vashon Heights, Burton, Dockton and along parts of the shoreline. Multifamily, commercial and industrial uses are presently concentrated in the unincorporated town of Vashon and adjacent areas where sewer and other urban services are available (Vashon-Maury Island Ground Water Management Plan, 1998).

VMI relies entirely on precipitation for its water supply and, on average, 40 in/yr. falls on the island. Shallow aquifers, soil moisture, and surface waters respond fairly quickly to variations in precipitation: abundant rainfall will quickly recharge the shallow aquifers, rivers, and lakes, and a lack of rainfall will cause these water supplies to be depleted. Deeper aquifers are different since usually they can take years or, in some cases, up to thousands of years to recharge the aquifer.

The groundwater of VMI were divided, based on water table elevations, into four hydrostratigraphic zones in the VMI Groundwater Management Plan (GWMP). Observed water levels across VMI fluctuate seasonally and these fluctuations tend to correlate with rainfall. The largest fluctuations are seen in the shallowest hydrostratigraphic zone.

#### Previous Studies

Carr (1983) published the first comprehensive study of VMI's water resources and found no significant trends in the water levels of VMI. This report did indicate that the water supply may not support additional growth if the quality of the groundwater is compromised.

Water levels were again monitored during the development of the VMI GWMP. The water-bearing zones monitored during this study generally showed a stable or slight rise in the water level during the study and did not appear to be affected by groundwater withdrawals (VMI GWMP, 1998).

#### Water Level Trends

Between 1989-1993, water levels were recorded monthly at 25 wells to complete the VMI GWMP. Water levels were again recorded at 14 of these wells between 2001-2003 as part of King County's Ambient Monitoring Program to look for long-term trends. The water-level record for one of these wells, well #20 (W-20), is shown in Figure 1. W-20 shows seasonal fluctuations in water levels, but insignificant long-term changes, with the average water table elevation changing only -0.3 feet. Figure 2 compares the average water level between 1989-1993 to the average water level between 2001-2003 for 14 wells on VMI. There do not appear to be any clear water level trends since 1989,

with a majority of the wells changing by less than 2 feet.

These 14 wells were further categorized into the four hydrostratigraphic zones to see if there was a correlation between the depth of the well and the water-level changes. The shallowest wells are on the left side of Figure 2 and the wells get progressively deeper as you move right. Again, no clear correlation is seen between the depth of the wells and the water level changes.

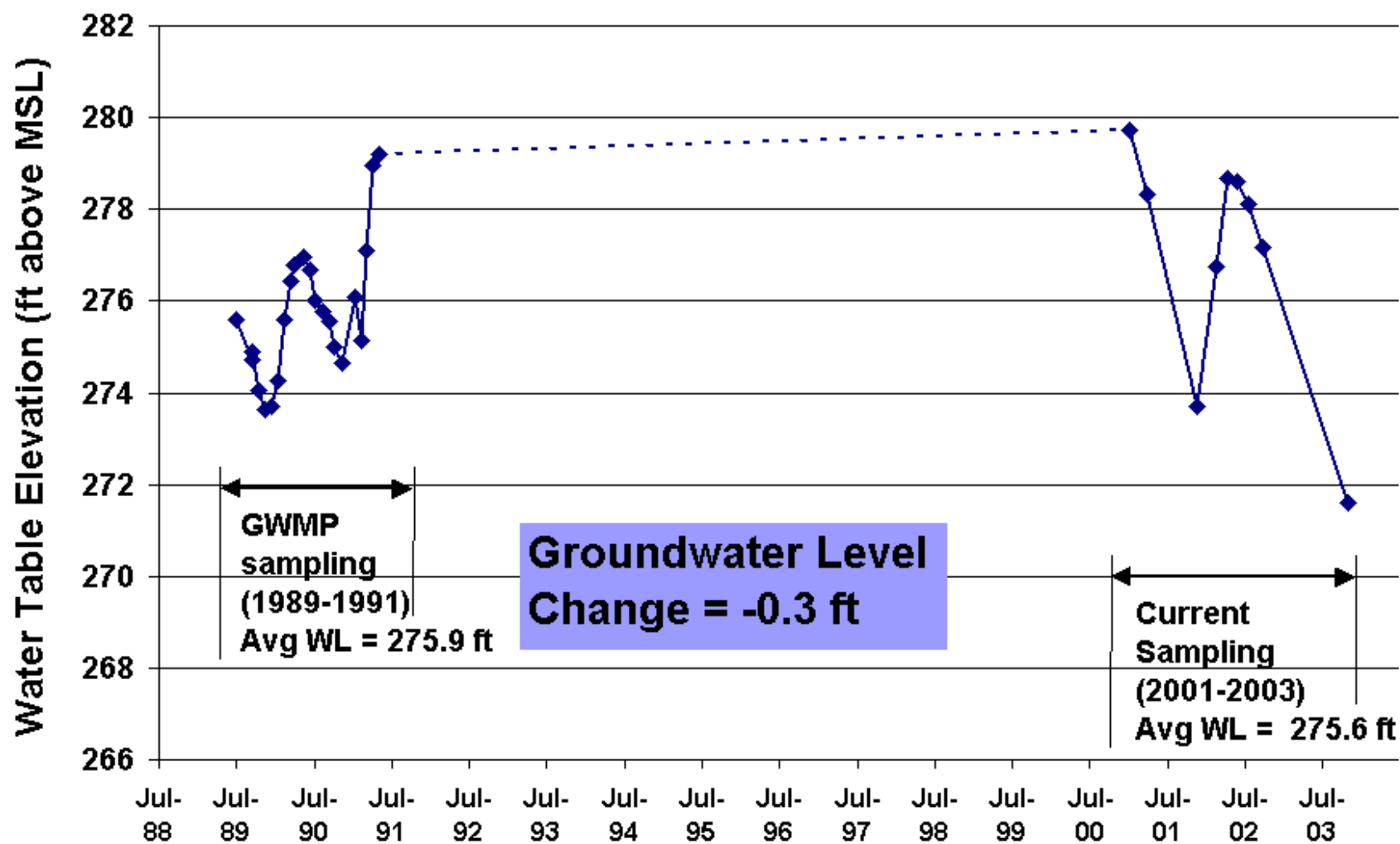
Since 2001, a team of 8 volunteers have been recording monthly water levels and reporting the data to the King County Groundwater Protection Program. Figure 3 is a water level hydrograph that compares the water level measurements at 4 of these wells to the average water level measurement for each well. As you can see, the data show minor decreases in water levels over the past three years. These decreases may be caused by lower-than-normal aquifer recharge due to precipitation variations. Similar decreases in water levels are being seen in other parts of the King County that monitor water level trends and these decreases have been linked to precipitation trends.

#### Conclusions

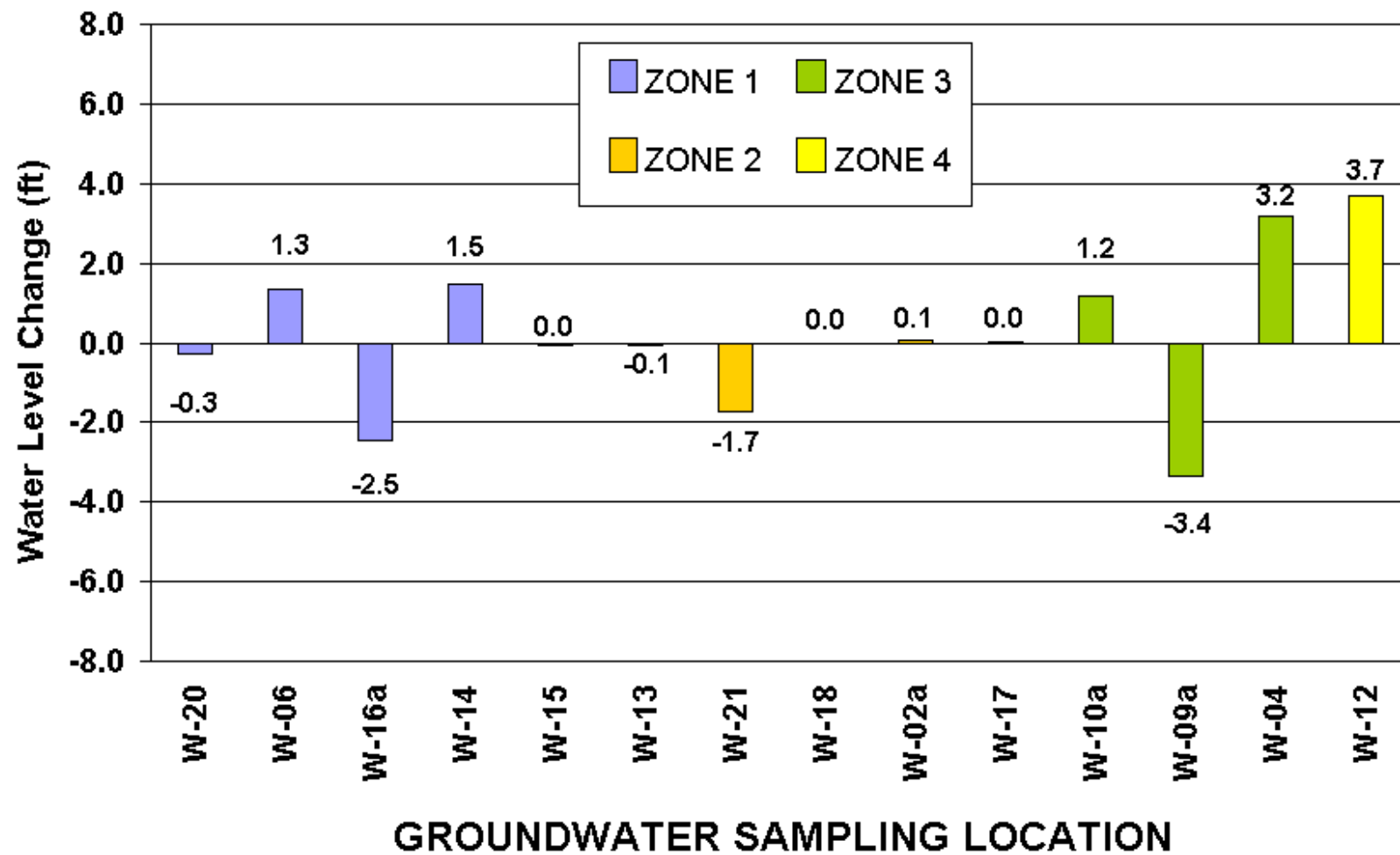
Currently, the identified water level trends on Vashon-Maury Island are not significant. The observed water level decreases since 2001 follow precipitation patterns and similar trends are being observed in other parts of the King County.

Groundwater levels provide valuable information on the status of VMI's water supply and will be monitored closely as part of the VMI Water Resources Evaluation. More details about water level changes in response to climate and land use changes will be available after the completion of the transient groundwater flow model (Phase 2).

# Figure 1. W-20 Water Levels



**Figure 2. Changes in VMI Water Levels since GWMP Sampling**



# Figure 3. Well Hydrographs

Zone 1 Relative Water Levels

